

AGRICULTURAL SURVEYING

Curriculum Content Framework

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Curriculum Content Framework

Agricultural Surveying

Grade Levels: 10, 11, 12
Course Code: 491090

Prerequisites: None

Course Description: This is a one-semester course of land surveying, land description, and construction. Surveying also covers GPS, GIS, FFA, and SAE.

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Unit 1: Introduction to Surveying

10 Hours

Terminology: Baseline, Initial point, Land measurement, Leveling, Principal meridian, Surveying

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
1.1 Define terms		Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3]
			Writing	Applies/Understands technical words and concepts [1.3.6]
1.2 Discuss the historical applications of surveying	1.2.1 Create a timeline of historical events	Foundation	Listening	Listens for content [1.2.3] Listens for long-term contexts [1.2.7]
1.3 Identify the uses of surveying		Foundation	Listening	Listens for content [1.2.3] Receives and interprets verbal messages [1.2.8]
1.4 Describe the importance of surveying		Thinking	Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]
1.5 List safety practices used in surveying		Foundation	Writing	Adapts notes to proper form [1.6.1] Writes/Prints legibly [1.6.24]
1.6 Identify federal surveying agencies (USGS, BLM, NGS)	1.6.1 Prepare a report covering the history and role of each agency	Foundation	Speaking	Communicates a thought/idea/fact in spoken form [1.5.5] Speaks effectively using appropriate eye contact, gestures, and posture [1.5.11]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
1.7 List careers in surveying	1.7.1 Conduct a search (newspaper classified ads, Internet) for surveying jobs	Personal Management Skills	Career Awareness, Development, and Mobility	Develops skills to locate, evaluate, and interpret career information [3.1.4] Identifies education and training needed to achieve goals [3.1.8]
1.8 Identify surveying applications in Career Development Events		Interpersonal	Teamwork	Works effectively with others to reach a common goal [2.6.6] Demonstrates understanding, friendliness, adaptability, empathy, and politeness in new and ongoing group settings [2.6.3]

Unit 2: Measurement in Surveying

10 Hours

Terminology: Acre, Chain, Compass, Decimal, Foot, Level, Metric system, Odometer, Pacing, Rod, Taping, Unit, Yard

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
2.1 Define terms used in land measurement		Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3] Applies/Understands technical words and concepts [1.3.6]
2.2 Identify methods of horizontal measurement	2.2.1 Demonstrate method of pacing to find distance 2.2.2 Demonstrate using an odometer to determine a distance between two points 2.2.3 Demonstrate use of a tape to determine distance 2.2.4 Demonstrate use of electronic devices in determining distance	Foundation	Math Listening	Makes rough measurements [1.1.28] Makes precision measurements using electronic equipment [1.1.27] Evaluates oral information/presentation [1.2.2]
2.3 Identify methods of determining land area	2.3.1 Calculate the area of a square in square feet and acres 2.3.2 Calculate the area of a rectangle in square feet and acres 2.3.3 Calculate the area of a triangle in square feet and acres	Foundation	Math	Computes using a formula [1.1.14] Converts different units of measurement [1.1.17]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
	2.3.4 Calculate the area of a parallelogram in square feet and acres			
2.4 Describe the methods of determining elevation measurements	2.4.1 Determine elevation using various methods	Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]
		Foundation	Listening	Receives and interprets verbal messages [1.2.8]
2.5 Determine angular measurements	2.5.1 Take single horizontal angle measurements	Foundation	Math	Uses common measuring devices/tools to determine angles [1.1.37]
	2.5.2 Determine azimuths and calculate bearings			Expresses mathematical ideas and concepts orally and in writing [1.1.23]
2.6 Convert measurements between the English and metric systems		Foundation	Math	Converts different units of measurement [1.1.17]

Unit 3: Legal Land Descriptions

10 Hours

Terminology: Quarter-quarter section, Quarter section, Range, Section, Tier, Township, Tract

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
3.1 Define terms		Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3] Applies/Understands technical words and concepts [1.3.6]
3.2 Discuss the history of land descriptions		Foundation	Listening	Evaluates oral information/presentation [1.2.2] Listens for content [1.2.3]
3.3 Describe the uses of land descriptions	3.3.1 Locate legal land descriptions	Personal Management	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]
3.4 Identify the sources of boundary descriptions	3.4.1 Identify legal boundary descriptions for properties from deed and plot books	Personal Management	Responsibility	Sets high standards for self in completion of a task [3.4.9]
3.5 Discuss rectangular survey systems	3.5.1 In a plot book, identify principal meridians, baselines, initial points, tracts, townships, sections, and divisions of sections	Foundation	Reading Writing	Applies information and concepts derived from printed materials [1.3.3] Applies/Uses technical words and concepts [1.6.4]

Unit 4: Types of Leveling Equipment

10 Hours

Terminology: Backsight, Benchmark, Carryall, Foresight, Grade rod, Height of instrument, Land plane, Plumb bob, String level, Transit, Tripod, Turning point

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
4.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
4.2 Describe different types of levels and leveling equipment		Foundation	Writing	Applies/Uses technical words and concepts [1.6.4] Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]
4.3 Describe care of leveling instrument	4.3.1 Demonstrate the proper way to handle the leveling instrument	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]
4.4 Identify parts of a leveling instrument		Foundation	Writing	Applies/Uses technical words and concepts [1.6.4] Communicates thoughts, ideas, or facts in written form in a clear, concise manner [1.6.6]
4.5 Identify steps in setting up a level	4.5.1 Demonstrate ability to level the leveling instrument	Interpersonal Thinking	Teamwork Problem Solving	Works effectively with others to reach a common goal [2.6.6] Recognizes/Defines problem [4.4.8]
4.6 Determine elevations with a grade rod	4.6.1 Take elevation reading from a grade rod	Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]

Unit 5: Field Notes & Hand Signals

5 Hours

Terminology: Accuracy, Arrangement, Field notes, Hand signal, Integrity, Legibility, Plumb

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
5.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
5.2 Explain how field notes are used		Foundation	Writing	Adapts notes to a proper form [1.6.1] Applies rules of grammar, punctuation, capitalization, and spelling [1.6.3] Writes/Prints legibly [1.6.24]
5.3 Discuss the quality requirements of field notes		Foundation	Writing	Adapts notes to a proper form [1.6.1] Applies rules of grammar, punctuation, capitalization, and spelling [1.6.3] Writes/Prints legibly [1.6.24]
5.4 Describe the types of field notes	5.4.1 Compile field notes (tabulations, sketches, descriptions)	Foundation	Writing	Adapts notes to a proper form [1.6.1] Applies rules of grammar, punctuation, capitalization, and spelling [1.6.3] Writes/Prints legibly [1.6.24]
5.5 Identify hand signals	5.5.1 Demonstrate the use of hand signals (up, down, all right, plumb the rod, take turning point, move right, and move left)	Foundation	Speaking	Interprets nonverbal cues such as eye contact, posture, and gestures for meaning [1.5.6]

Unit 6: Leveling Operations 20 Hours

Terminology: Batter boards, Cut, Fill, Footing, Foundation wall, Grade, Line of sight

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
6.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
6.2 Describe differential leveling	6.2.1 Demonstrate the process of differential leveling	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]
6.3 Describe profile leveling	6.3.1 Perform profile leveling	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]
6.4 Describe contour mapping	6.4.1 Create a contour map of the school	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]
6.5 Describe the processes of grading, cutting, and filling	6.5.1 Observe cuts, fills, and grades on roadways	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]
6.6 Describe the procedure of laying a foundation	6.6.1 Square the corners for a 10x20 barn, and locate boundaries on the footing	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]

Unit 7: GPS/GIS

25 Hours

Terminology: GIS, GPS, Way point

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
7.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
7.2 Describe the functions of a GIS software program	7.2.1 Create a mental map of the local community	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]
	7.2.2 Using GIS software, compare your mental map with an aerial photo			Communicates a thought, idea, or fact in spoken form [1.5.5]
7.3 Describe the capacities of GPS	7.3.1 Demonstrate the use of a hand-held GPS unit	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]
	7.3.2 Research types of GPS training at www.esri.com			Communicates a thought, idea, or fact in spoken form [1.5.5]

Glossary

Unit 1: Introduction to Surveying

1. Baseline—true east/west line
2. Initial point—point at which principal meridians and baselines cross
3. Land measurement—process of determining distances across and locations of tracts of land
4. Leveling—determines the difference in elevation between points
5. Principal meridian—true north/south line
6. Surveying—operation that maps and measures land

Unit 2: Measurement in Surveying

1. Acre—measurement equaling 43,560 square feet
2. Chain—measurement of 66 feet
3. Compass—device used to determine angles
4. Decimal—incremental part of a measurement
5. Foot—measurement equaling 12 inches
6. Level—device used to find differences in elevation
7. Metric system—system of measurement based on foundation units; increases or decreases by powers of 10
8. Odometer—measuring wheel
9. Pacing—method of determining distance by counting steps
10. Rod—measurement of $16\frac{1}{2}$ feet
11. Taping—method of determining distance using a measuring tape
12. Unit—word describing a number
13. Yard—measurement equaling three feet

Unit 3: Legal Land Descriptions

1. Quarter-quarter section— $1/16$ th of a section; contains 40 acres
2. Quarter section—one-fourth of a section; contains 160 acres
3. Range—a series of adjacent townships running north and south
4. Section—an area of land measuring one square mile and containing 640 acres
5. Tier—a series of adjacent townships running east and west
6. Township—an area of land measuring six square miles and containing 36 sections
7. Tract—an area of land measuring 24 square miles

Unit 4: Types of Leveling Equipment

1. Backsight—a reading taken from a known elevation
2. Benchmark—a point of reference for which elevation is known or assumed
3. Carryall—a machine used to remove soil and rock from a location
4. Foresight—a reading taken on a new point to determine its elevation
5. Grade rod—a rod used to find distance from ground to line of sight
6. Height of instrument—elevation of line of sight
7. Land plane—a machine used to level land
8. Plumb bob—a device used to find vertical point
9. String level—a tool suspended on a string to find level horizontal lines
10. Transit—a device used to find differences in elevation and vertical angles
11. Tripod—a three-legged device on which the level sits
12. Turning point—a temporary point of known elevation

Unit 5: Field Notes & Hand Signals

1. Accuracy—absence of mistakes
2. Arrangement—notes written in logical order
3. Field notes—a record of sitings made on the rod
4. Hand signal—sign language used for accurate communication between rod holder and instrument operator
5. Integrity—complete, accurate work
6. Legibility—writing that can be read and interpreted
7. Plumb—a vertical line at a 90-degree angle to a horizontal line

Unit 6: Leveling Operations

1. Batter boards—stakes used to locate corners of a building
2. Cut—removal of soil and rock from an area
3. Fill—placement of soil and rock in an area
4. Footing—base on which the foundation is set
5. Foundation wall—rock or concrete wall that sits on the footing and supports the building
6. Grade—established slope
7. Line of sight—path of vision as seen through a leveling instrument

Unit 7: GPS/GIS

1. GIS—Geographic Information Systems; type of software that stores data in a graphical form
2. GPS—Global Positioning Systems; a series of networked satellites that determine through triangulation where something is
3. Way point—location taken on a route